CLAIMS

We claim:

1. A method for dynamically varying a frequency response of a frequency selective surface, comprising the steps of:

controlling a transmission of electromagnetic energy through a surface by passing selected frequencies in a pass-band and blocking selected frequencies in a stop-band; and

dynamically modifying at least one of said pass-band and said stop-band by selectively varying at least one of a position and a volume of a conductive fluid forming at least a portion of said surface.

2. The method according to claim 1 further comprising the step of forming a plurality of elements of said frequency selective surface to have a shape selected from the group consisting of tripoles, circles, crosses, Jerusalem crosses, rings, rectangles and squares.

3. The method according to claim 1 further comprising the step of forming a plurality of elements of said frequency selective surface by defining periodic perforations of a selected geometry in a conductive ground plane.

4. The method according to claim 3 wherein said dynamically modifying step further comprises the step of injecting said conductive fluid into a fluid channel formed adjacent to a portion of said conductive ground plane.

5. The method according to claim 4 further comprising the step of electrically coupling said conductive fluid contained in said channel to said conductive ground plane.

6. The method according to claim 3 further comprising the step of disposing said conductive ground plane on a dielectric substrate.

7. The method according to claim 6 further comprising the step of constraining said conductive fluid in a cavity structure defined within said dielectric substrate.

8. The method according to claim 7 further comprising the step of forming said cavity structure within a portion of said dielectric substrate entirely within a boundary defined by said conductive ground plane.

9. The method according to claim 1 further comprising the step of selecting said conductive fluid to be formed of gallium and indium alloyed with a material selected from the group consisting of tin, copper, zinc and bismuth.

10. The method according to claim 1 further comprising the step of varying at least one of said position and said volume of said conductive fluid in response to a control signal.

11. The method according to claim 1 wherein said dynamically modifying step is further comprised of changing at least one dimension of a plurality of periodic elements of said frequency selective surface.

12. The method according to claim 1 wherein said dynamically modifying step is further comprised of changing a shape of said plurality of periodic elements.

13. A dynamically variable frequency selective surface, comprising:

a periodic resonance structure having a plurality of elements periodically spaced over a surface, each of said elements having a resonant frequency;

a conductive fluid; and

a fluid control system dynamically varying at least one of a position and a volume of said conductive fluid within said periodic resonance structure to change at least one dimension of said plurality of elements.

14. The dynamically variable frequency selective surface according to claim 13 wherein said plurality of elements are comprised of periodic perforations of a selected geometry in a conductive ground plane.

15. The dynamically variable frequency selective surface according to claim 14 wherein said fluid control system selectively adds and removes said conductive fluid from a fluid channel formed adjacent to a portion of said conductive ground plane.

16. The dynamically variable frequency selective surface according to claim 15 wherein said conductive fluid contained in said channel is electrically coupled to said conductive ground plane.

17. The dynamically variable frequency selective surface according to claim 14 wherein said conductive ground plane is disposed on a dielectric substrate.

18. The dynamically variable frequency selective surface according to claim 17 further comprising a cavity structure defined within said dielectric substrate for storing a predetermined volume of said conductive fluid.

19. The dynamically variable frequency selective surface according to claim 18 wherein said cavity structure is disposed within a portion of said dielectric substrate entirely within a boundary defined by said conductive ground plane.

20. The dynamically variable frequency selective surface according to claim 13 wherein said conductive fluid is comprised of gallium and indium alloyed with a material selected from the group consisting of tin, copper, zinc and bismuth.

21. The dynamically variable frequency selective surface according to claim 13 wherein said fluid control system is responsive to a control signal.

22. The dynamically variable frequency selective surface according to claim 13 wherein said fluid control system dynamically modifies said resonant frequency.

23. The dynamically variable frequency selective surface according to claim 13 wherein said plurality of elements have a shape selected from the group consisting of tripoles, circles, crosses, Jerusalem crosses, rings, rectangles and squares.

24. A dynamically variable frequency selective surface, comprising:

a periodic resonance structure having a plurality of elements periodically spaced over a surface, each of said elements having a resonant frequency;

a conductive fluid; and

a fluid control system for dynamically varying at least one of a position and a volume of said conductive fluid within said periodic resonance structure to change a shape of said plurality of elements.